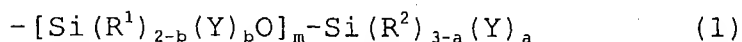


CLAIMS

1. A curable composition comprising the following two components:

5 (A1) a vinyl polymer having at least one crosslinking silyl group of the general formula (1) on the average per molecule:



wherein R^1 and R^2 may be the same or different and each represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms, an aralkyl group containing 7 to 20 carbon atoms, or a triorganosiloxy group of the formula $(\text{R}')_3\text{SiO}-$, where R' represents a univalent hydrocarbon group containing 1 to 20 carbon atoms and the plurality of R' groups may be the same or different, and when two or more R^1 or R^2 groups are present, the plurality of groups may be the same or different; Y represents a hydroxyl group or a hydrolyzable group and, when two or more Y groups are present, they may be the same or different; a represents an integer of 0, 1, 2 or 3; b represents an integer of 0, 1 or 2; m is an integer of 0 to 19; with the condition that the relation of $a + mb \geq 1$ is satisfied and

(B) a photocurable substance.

2. The curable composition according to Claim 1,
25 wherein the vinyl polymer (A1) has a molecular weight distribution value of less than 1.8.

3. The curable composition according to Claim 1 or 2,
wherein the vinyl polymer (A1) is a (meth)acrylic
30 polymer.

4. The curable composition according to Claim 3
wherein the vinyl polymer (A1) is an acrylic polymer.

35 5. The curable composition according to any of Claims

1 to 4

wherein the vinyl polymer (A1) has a main chain produced by living radical polymerization technique.

5

6. The curable composition according to Claim 5 wherein the vinyl polymer (A1) has a main chain produced by atom transfer radical polymerization technique.

10

7. The curable composition according to any of Claims 1 to 6

wherein the vinyl polymer (A1) has at least one crosslinking silyl group of the general formula (1) at the molecular chain terminus on the average per molecule.

15

8. The curable composition according to any of Claims 1 to 7

wherein the vinyl polymer (A1) is obtainable by a process comprising

20

(1) a step of polymerizing a vinyl monomer by an atom transfer radical polymerization technique to synthesize a halogen-terminated vinyl polymer,

25

(2) a step of reacting the halogen-terminated vinyl polymer obtained in said step (1) with an alkenyl group-containing oxyanion to effect substitution for the halogen and thereby synthesize an alkenyl-terminated vinyl polymer, and

30

(3) a step of adding a hydrosilane compound having a crosslinking silyl group represented by the general formula (1) to the terminal alkenyl group of the alkenyl-terminated vinyl polymer obtained in said step (2) to convert the terminal alkenyl group to a substituent containing said crosslinking silyl group.

9. The curable composition according to any of Claims 1 to 7

35

wherein the vinyl polymer (A1) is obtainable by a process

comprising

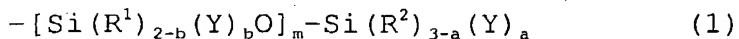
- (1) a step of polymerizing a vinyl monomer by a living radical polymerization technique to prepare a vinyl polymer,
- (2) a step of reacting the polymer further with a compound having at least two sparingly polymerizable alkenyl groups to synthesize an alkenyl-terminated vinyl polymer, and
- (3) a step of adding a hydrosilane compound having a crosslinking silyl group represented by the general formula (1) to the terminal alkenyl group of the alkenyl-terminated vinyl polymer obtained in said step (2) to convert the terminal alkenyl group to a substituent containing said crosslinking silyl group.

10. The curable composition according to any of Claims 1 to 9

wherein the photocurable substance (B) is an unsaturated acrylic compound.

11. A curable composition comprising the following two components:

(A2) a vinyl polymer having at least one crosslinking silyl group of the general formula (1) on the average per molecule:



- wherein R¹ and R² may be the same or different and each represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms, an aralkyl group containing 7 to 20 carbon atoms, or a triorganosiloxy group of the formula (R')₃SiO-, where R' represents a univalent hydrocarbon group containing 1 to 20 carbon atoms and the plurality of R' groups may be the same or different, and when two or more R¹ or R² groups are present, the plurality of groups may be the same or different; Y represents a hydroxyl group or a hydrolyzable group and, when two or more Y groups are present, they may be the same or different; a represents an integer of 0, 1, 2 or 3; b represents an integer of 0, 1 or 2; m is an integer of 0 to 19;

with the condition that the relation of $a + mb \geq 1$ is satisfied and

(C) an air oxidation-curable substance..

5 12. The curable composition according to Claim 11
 wherein the vinyl polymer (A2) has a molecular weight
distribution value of less than 1.8.

10 13. The curable composition according to Claim 11 or 12
 wherein the vinyl polymer (A2) is a (meth)acrylic
polymer.

15 14. The curable composition according to Claim 13
 wherein the vinyl polymer (A2) is an acrylic polymer.

15 15. The curable composition according to any of Claims
11 to 14
 wherein the vinyl polymer (A2) has a main chain produced
by living radical polymerization technique.

20 16. The curable composition according to Claim 15
 wherein the vinyl polymer (A2) has a main chain produced
by atom transfer radical polymerization technique.

25 17. The curable composition according to any of Claims
11 to 16
 wherein the vinyl polymer (A2) has at least one
crosslinking silyl group of the general formula (1) at the
molecular chain terminus on the average per molecule.

30 18. The curable composition according to any of Claims
11 to 17

 wherein the vinyl polymer (A2) is obtainable by a process
comprising
35 (1) a step of polymerizing a vinyl monomer by an atom transfer

radical polymerization technique to synthesize a halogen-terminated vinyl polymer,

- (2) a step of reacting the halogen-terminated vinyl polymer obtained in said step (1) with an alkenyl group-containing oxyanion to effect substitution for the halogen and thereby
5 synthesize an alkenyl-terminated vinyl polymer, and
(3) a step of adding a hydrosilane compound having a crosslinking silyl group represented by the general formula (1) to the terminal alkenyl group of the alkenyl-terminated vinyl
10 polymer obtained in said step (2) to convert the terminal alkenyl group to a substituent containing said crosslinking silyl group.

19. The curable composition according to any of Claims
15 11 to 17

wherein the vinyl polymer (A2) is obtainable by a process comprising

- (1) a step of polymerizing a vinyl monomer by a living radical polymerization technique to prepare a vinyl polymer,
20 (2) a step of reacting the polymer further with a compound having at least two sparingly polymerizable alkenyl groups to synthesize an alkenyl-terminated vinyl polymer, and
(3) a step of adding a hydrosilane compound having a crosslinking silyl group represented by the general formula (1)
25 to the terminal alkenyl group of the alkenyl-terminated vinyl polymer obtained in said step (2) to convert the terminal alkenyl group to a substituent containing said crosslinking silyl group.

- 30 20. The curable composition according to any of Claims 11 to 19

wherein the air oxidation-curable substance (C) is tung oil or a liquid diene polymer.

- 35 21. A curable composition comprising the following two

components:

(A3) a vinyl polymer having at least one crosslinking functional group on the average per molecule and

(D) a high molecular plasticizer.

5

22. The curable composition according to Claim 21 wherein the vinyl polymer (A3) is a molecular weight distribution value of less than 1.8.

10

23. The curable composition according to Claim 21 or 22 wherein the vinyl polymer (A3) is a (meth) acrylic polymer.

24. The curable composition according to Claim 21 or 22 wherein the vinyl polymer (A3) is an acrylic polymer.

15

25. The curable composition according to any of Claims 21 to 24

wherein the crosslinking functional group of the vinyl polymer (A3) is a crosslinking silyl group.

20

26. The curable composition according to any of Claims 21 to 24

wherein the crosslinking functional group of the vinyl polymer (A3) is an alkenyl group.

25

27. The curable composition according to any of Claims 21 to 24

wherein the crosslinking functional group of the vinyl polymer (A3) is a hydroxyl group.

30

28. The curable composition according to any of Claims 21 to 24

wherein the crosslinking functional group of the vinyl polymer (A3) is an amino group.

35

29. The curable composition according to any of Claims
21 to 24

wherein the crosslinking functional group of the vinyl
polymer (A3) has a polymerizable carbon-carbon double bond.

5

30. The curable composition according to any of Claims
21 to 24

wherein the crosslinking functional group of the vinyl
polymer (A3) is an epoxy group.

10

31. The curable composition according to any of Claims
21 to 30

wherein the vinyl polymer (A3) has a main chain produced
by living radical polymerization technique.

15

32. The curable composition according to Claim 31

wherein the vinyl polymer (A3) has a main chain produced
by atom transfer radical polymerization technique.

20

33. The curable composition according to Claim 32

wherein the atom transfer radical polymerization
technique is carried out by using, as the catalyst, a transition
metal complex whose center metal belongs to group 7, 8, 9, 10
or 11 of the periodic table of the elements.

25

34. The curable composition according to Claim 33

wherein the transition metal complex is a complex of copper,
nickel, ruthenium or iron.

30

35. The curable composition according to Claim 34

wherein the transition metal complex is a complex of
copper.

35

36. The curable composition according to any of Claims

21 to 35

wherein the high molecular plasticizer (D) has a number average molecular weight of 500 to 15000.

37. The curable composition according to Claim 36
5 wherein the high molecular plasticizer (D) has a number average molecular weight of 800 to 10000.

38. The curable composition according to Claim 37
10 wherein the high molecular plasticizer (D) has a number average molecular weight of 1000 to 8000.

39. The curable composition according to any of Claims
21 to 38
15 wherein the high molecular plasticizer (D) is a vinyl polymer.

40. The curable composition according to Claim 39
20 wherein the high molecular plasticizer (D) has a molecular weight distribution value of less than 1.8.

41. The curable composition according to Claim 39 or 40
wherein the high molecular plasticizer (D) is a
(meth)acrylic polymer.

42. The curable composition according to Claim 40 or 41
25 wherein the high molecular plasticizer (D) is an acrylic polymer.

43. The curable composition according to any of Claims
30 40 to 42
wherein the high molecular plasticizer (D) is produced by living radical polymerization technique.

44. The curable composition according to Claim 43
35 wherein the high molecular plasticizer (D) is produced

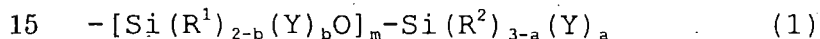
by atom transfer radical polymerization technique.

45. The curable composition according to any of Claims 21 to 44

5 wherein the addition amount of the high molecular plasticizer (D) is 5 to 150 weight parts based on 100 weight parts of the vinyl polymer (A3) having at least one crosslinking functional group.

10 46. A curable composition comprising the following two components:

(A4) a vinyl polymer having not less than 1.1 of crosslinking silyl group of the general formula (1) on the average per molecule:



wherein R^1 and R^2 may be the same or different and each represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms, an aralkyl group containing 7 to 20 carbon atoms, or a triorganosiloxy group of the formula
20 $(\text{R}')_3\text{SiO}-$, where R' represents a univalent hydrocarbon group containing 1 to 20 carbon atoms and the plurality of R' groups may be the same or different, and when two or more R^1 or R^2 groups are present, the plurality of groups may be the same or different; Y represents a hydroxyl group or a hydrolyzable group
25 and, when two or more Y groups are present, they may be the same or different; a represents an integer of 0, 1, 2 or 3; b represents an integer of 0, 1 or 2; m is an integer of 0 to 19; with the condition that the relation of $a + mb \geq 1$ is satisfied and

30 (E) a reactive plasticizer comprising a vinyl polymer having not more than one of crosslinking silyl group of the general formula (1) on the average per molecule.

47. The curable composition according to Claim 46

35 wherein the vinyl polymer (A4) has a molecular weight

distribution value of less than 1.8.

5

48. The curable composition according to Claim 46 or 47 wherein the vinyl polymer (A4) is a (meth)acrylic polymer.

49. The curable composition according to Claim 48 wherein the vinyl polymer (A4) is an acrylic polymer.

10

50. The curable composition according to any of Claims 46 to 49 wherein the vinyl polymer (A4) has a main chain produced by living radical polymerization technique.

15

51. The curable composition according to Claim 50 wherein the vinyl polymer (A4) has a main chain produced by atom transfer radical polymerization technique.

20

52. The curable composition according to any of Claims 46 to 51 wherein the vinyl polymer (A4) has not less than 1.1 of crosslinking silyl group of the general formula (1) at the molecular chain terminus on the average per molecule.

25

53. The curable composition according to any of Claims 46 to 52 wherein the vinyl polymer (A4) is obtainable by a process comprising

30

(1) a step of polymerizing a vinyl monomer by an atom transfer radical polymerization technique to synthesize a halogen-terminated vinyl polymer,

(2) a step of reacting the halogen-terminated vinyl polymer obtained in said step (1) with an alkenyl group-containing oxyanion to effect substitution for the halogen and thereby synthesize an alkenyl-terminated vinyl polymer, and

35

(3) a step of adding a hydrosilane compound having a

crosslinking silyl group represented by the general formula (1) to the terminal alkenyl group of the alkenyl-terminated vinyl polymer obtained in said step (2) to convert the terminal alkenyl group to a substituent containing said crosslinking silyl group.

54. The curable composition according to any of Claims 46 to 52

wherein the vinyl polymer (A4) is obtainable by a process comprising

(1) a step of polymerizing a vinyl monomer by a living radical polymerization technique to prepare a vinyl polymer,
(2) a step of reacting the polymer further with a compound having at least two sparingly polymerizable alkenyl groups to synthesize an alkenyl-terminated vinyl polymer, and
(3) a step of adding a hydrosilane compound having a crosslinking silyl group represented by the general formula (1) to the terminal alkenyl group of the alkenyl-terminated vinyl polymer obtained in said step (2) to convert the terminal alkenyl group to a substituent containing said crosslinking silyl group.

55. The curable composition according to any of Claims 46 to 54

wherein the reactive plasticizer (E) has a molecular weight distribution value of less than 1.8.

56. The curable composition according to any of Claims 46 to 55

wherein the reactive plasticizer (E) has a number average molecular weight of 500 to 15000.

57. The curable composition according to any of Claims 46 to 56

wherein the reactive plasticizer (E) is lower in

viscosity than the vinyl polymer (A4).

58. The curable composition according to any of Claims 46 to 57

5 wherein the reactive plasticizer (E) is a (meth)acrylic polymer.

59. The curable composition according to Claim 58
10 wherein the reactive plasticizer (E) is an acrylic polymer.

60. The curable composition according to any of Claims 46 to 59

15 wherein the reactive plasticizer (E) has a polymer main chain produced by living radical polymerization technique.

61. The curable composition according to Claim 60
20 wherein the reactive plasticizer (E) has a polymer main chain produced by atom transfer radical polymerization technique.

62. The curable composition according to any of Claims 46 to 61

25 wherein the reactive plasticizer (E) is obtainable by a process comprising

(1) a step of polymerizing a vinyl monomer by an atom transfer radical polymerization technique to synthesize a vinyl polymer having a highly reactive carbon-halogen bond at only one molecular chain terminus,

30 (2) a step of reacting the vinyl polymer having a highly reactive carbon-halogen bond at only one molecular chain terminus as obtained in said step (1) with an alkenyl group-containing oxyanion to effect substitution for the halogen and thereby synthesize a vinyl polymer having an alkenyl group at only one
35 molecular chain terminus, and

(3) a step of adding a hydrosilane compound having a crosslinking silyl group represented by the general formula (1) to the terminal alkenyl group of the vinyl polymer having an alkenyl group at only one molecular chain terminus as obtained in said step (2) to convert the terminal alkenyl group to a substituent containing said crosslinking silyl group.

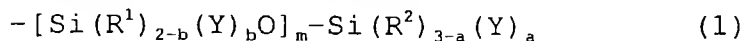
63. The curable composition according to any of Claims 46 to 61

wherein the reactive plasticizer (E) is produced by a process comprising

- (1) a step of polymerizing a vinyl monomer by a living radical polymerization technique using an initiator having one initiation point to prepare a vinyl polymer,
- (2) a step of reacting the polymer further with a compound having at least two sparingly polymerizable alkenyl groups to synthesize an alkenyl-terminated vinyl polymer, and
- (3) a step of adding a hydrosilane compound having a crosslinking silyl group represented by the general formula (1) to the terminal alkenyl group of the alkenyl-terminated vinyl polymer obtained in said step (2) to convert the terminal alkenyl group to a substituent containing said crosslinking silyl group.

64. A curable composition comprising the following two components:

(A5) a vinyl polymer having at least one crosslinking silyl group of the general formula (1) on the average per molecule, the main chain of which polymer has been obtained by a living polymerization technique;



wherein R^1 and R^2 may be the same or different and each represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms or an aralkyl group containing 7 to 20 carbon atoms and when two or more R^1 or R^2 groups are

present, the plurality of groups may be the same or different; Y represents a hydroxyl group or a hydrolyzable group and, when two or more Y groups are present, they may be the same or different; a represents an integer of 0, 1, 2 or 3; b represents an integer of 0, 1 or 2; m is an integer of 0 to 19; with the condition that the relation of $a + mb \geq 1$ is satisfied, and (F) a compound (I) having one silanol group per molecule and/or a compound (II) capable of reacting with moisture to give a compound having one silanol group per molecule.

10

65. The curable composition according to Claim 64 wherein the vinyl polymer (A5) has a molecular weight distribution value of less than 1.8.

15

66. The curable composition according to Claim 64 or 65 wherein the vinyl polymer (A5) is a (meth)acrylic polymer.

67. The curable composition according to Claim 66 wherein the vinyl polymer (A5) is an acrylic polymer.

20

68. The curable composition according to any of Claims 64 to 67

wherein the vinyl polymer (A5) has a main chain produced by living radical polymerization technique.

25

69. The curable composition according to Claim 68 wherein the vinyl polymer (A5) has a main chain produced by atom transfer radical polymerization technique.

30

70. The curable composition according to any of Claims 64 to 69

wherein the vinyl polymer (A5) has at least one crosslinking silyl group of the general formula (1) at the molecular chain terminus on the average per molecule.

35

71. The curable composition according to any of Claims 64 to 70

wherein the vinyl polymer (A5) is obtainable by a process comprising

- 5 (1) a step of polymerizing a vinyl monomer by an atom transfer radical polymerization technique to synthesize a halogen-terminated vinyl polymer,
- (2) a step of reacting the halogen-terminated vinyl polymer obtained in said step (1) with an alkenyl group-containing oxyanion to effect substitution for the halogen and thereby
- 10 synthesize an alkenyl-terminated vinyl polymer, and
- (3) a step of adding a hydrosilane compound having a crosslinking silyl group represented by the general formula (1) to the terminal alkenyl group of the alkenyl-terminated vinyl
- 15 polymer obtained in said step (2) to convert the terminal alkenyl group to a substituent containing said crosslinking silyl group.

72. The curable composition according to any of Claim 20 64 to 70

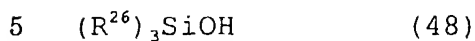
wherein the vinyl polymer (A5) is obtainable by a process comprising

- (1) a step of polymerizing a vinyl monomer by a living radical polymerization technique to prepare a vinyl polymer,
- 25 (2) a step of reacting the polymer further with a compound having at least two sparingly polymerizable alkenyl groups to synthesize an alkenyl-terminated vinyl polymer, and
- (3) a step of adding a hydrosilane compound having a crosslinking silyl group represented by the general formula (1)
- 30 to the terminal alkenyl group of the alkenyl-terminated vinyl polymer obtained in said step (2) to convert the terminal alkenyl group to a substituent containing said crosslinking silyl group.

35 73. The curable composition according to any of Claims

64 to 72

wherein the compound (I) having one silanol group per molecule for (F) component is represented by the general formula (48);



wherein R^{26} represents a univalent hydrocarbon group containing 1 to 20 carbon atoms and the plurality of R^{26} groups may be the same or different.

10 74. The curable composition according to any of Claims 64 to 72

wherein the compound (II) capable of reacting with moisture to give a compound having one silanol group per molecule, which is used as (F) component, is capable of reacting with moisture to give a compound represented by the general formula (48);



wherein R^{26} represents a univalent hydrocarbon group containing 1 to 20 carbon atoms and the plurality of R^{26} groups may be the same or different.

75. The curable composition according to Claim 74

wherein the compound (II) capable of reacting with moisture to give a compound having one silanol group per molecule, which is used as (F) component, is $(CH_3)_3SiNHSi(CH_3)_3$.

76. The curable composition according to Claim 74

wherein the compound (II) capable of reacting with moisture to give a compound having one silanol group per molecule, which is used as (F) component, is represented by the general formula (49);



wherein R^{26} represents a univalent hydrocarbon group containing 1 to 20 carbon atoms and the plurality of R^{26} groups may be the same or different; n represents a positive number; R^{27} represents

a residual group derived from an active hydrogen-containing compound by removal of part or the whole of active hydrogen.

5 77. The curable composition according to Claim 73, 74
or 76

wherein, referring to the compound represented by the general formula (48) or (49), at least one R^{26} group is a methyl group.

10 78. The curable composition according to Claim 73 or 74
wherein the compound represented by the general formula (48) is trimethylsilanol.

15 79. The curable composition according to Claim 76
wherein, referring to the general formula (49), the active hydrogen-containing compound from which R^{27} is derived is a phenol, an acid amide or an alcohol.